DOCUMENT RESUME

ED 196 524 PS 011 836

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TITLE Fire-Play and Fire-Setting of Young Children.
SPONS AGENCY Department of Agriculture, Washington, D.C.; Department of Health, Education, and Welfare, Washington, D.C.
PUB DATE Sep 80
NOTE 24p.; Paper presented at the Annual Convention of the American Psychological Association (88th, Montreal, Quebec, Canada, September 1-5, 1980).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Age Differences; *Behavior Problems; Blacks; *Childhood Interests; Comparative Analysis; Elementary Education; *Emotional Experience; Family Characteristics; Females; Health; Hispanic Americans; Males; One Parent Family; *Play; *Psychological Characteristics; Sex Differences; Whites
IDENTIFIERS Fires; *Firesetters; Hazards

ABSTRACT

Variables related to children's interest in and play experiences with fire and fire-producing materials were explored in this study. Information for the study was obtained from samples of public school children and their parents. The samples were drawn from the communities of Oakland and Hayward, California, and included 70 boys and 69 girls and their parents. Data were assembled through interviews and evaluations. Findings indicate that 37 children had played with fire and had burnt different items. Half of the burning behavior was done intentionally. About half of the children had been involved in play with matches, and several more reported playing with lighters or firecrackers. In order to analyze fire-play in detail, five categories of reported involvement in fire-play episodes were formed. Categories ranged in frequency of involvement from no episodes to many episodes. The five groups were then compared in terms of family background, child characteristics and child preference (for example their attraction to fire variables). Children who most frequently played with fire were rated higher in 20 mischievous behaviors than children less frequently involved in fire-play. Play with matches was found to be related to problem areas in children's lives. Findings further indicate that fire-playing, fire-setting, accident-prone, hyperactive and delinquent children show very similar behavioral and personality patterns to each other as well as similar family conditions. (Author/RH)

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Fire-play and fire-setting of young children

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PS 011936

Presented at the Symposium: Firesetting in children: A new look at an old problem. American Psychological Association Convention, Montreal 1980.

Funding for this research was provided by The Department of Health, Education, and Welfare and the United States Department of Agriculture.

Introduction

"Children and matches" constitute a respected category in most actuarial tables of fire statistics. This category implies a behavioral situation in which children and matches interact and cause injury and damage. Most of the early studies which dealt with fire-setting behavior of children were case studies in the tradition of the psychoanalytic theory which viewed fire-setting as a result of phallic fixated drives (for example Freud, 1932; Lewis & Yarnell, 1951). Later studies explained fire-setting by aggressive and sexual drive manifestations and included mainly samples of children who had a variet of developmental problems (for example, Kaufman, Heins & Reiser, 1961; Nurcombe, 1964; Vandersall & Wiener, 1970). In recent years researchers ceased to see fire-setting as exclusively the result of pathological behavior and terms like pyromania disappeared from the literature. In 1972 Dr. William Folkman from the Pacific Southwest Forest and Range Experimental Station, United States Department of Agriculture, emphasized the need to study fire behavior of normal children and initiated fundings of such studies. A pilot study conducted by Block, Block and Folkman in 1976 showed that two out of 47 5 and 6 year old children had been involved in agency documented fire-play and that interest in fire as reflected in requests to light matches or in playing with fire materials was expressed by 59% of the boys and 33% of the girls studied.

To further investigate fire-behaviors of children a random sample was drawn from the Berkeley Unified School district. In this study, published in 1978 and 1980, 99 boys attending kindergarten, second grade and fourth grade were interviewed with their parents in their homes. Results showed that 45%

of the boys were reported to have been involved in match-play. The plays of 21% of the children resulted in fires, one causing serious damage to a house and ten fires causing damage to household items. The fire department was called in three instances, and the fire fighters were expected to give the children educational instructions about fires, one parent called the "parental stress unit" for the same purpose. Detailed analysis of match-play revealed that the probability of setting fires increased with the frequency of play though the severity of the fire was influenced more by external conditions than by the child's behavior. These findings stress the importance of fire-play as a focal variable in any attempt to understand fire-setting of young children. Hence, fire-play was also the focus of the subsequent study reported in this presentation.

The study

In this study the definition of fire-play was extended to include use of any fire materials, notably: matches, lighters and firecrackers, without parental permission or supervision. Information for the study was gathered by extensive interviews of children and their parents conducted by teams of two interviewers.

The sample of this study included two Northern California communities, different from Berkeley and from each other. The first community is Oakland, a heterogeneous city of 361,603 people with a median yearly income of $11,009, and Hayward, a suburban community of 93,105 people with a median income of $9,626. (These statistics are based on the 1970 census of population, results of the 1980 are not yet available).

Fire-setting information normally shows that boys have a disproportionately high representation in hazardous fire behaviors, over 90% of the

fires worldwide are caused by boys. Knowledge about fire behaviors and especially fire-play of girls is non-existent. Hence, it was of interest to compare members of the two sexes on fire behaviors and both were included in the present study.

A sample of 70 boys and 69 girls, from the public schools of the two communities was studied. The children and their parents were thoroughly questioned about fire behaviors. In addition, information about family background, child characteristics and child preferences was collected.

Fires

Analysis of the fires set by the children showed that two fires were set accidently - a girl age three burnt a beanbag chair while sitting too close to a heater. Another girl, age nine climbed on the stove to get food and burnt herself severely (this girl was also involved in fire-play).

Parents reported of nine children who set grass fires while playing with matches with their friends or siblings, in a backyard or a park. The children were mostly involved in repeated episodes of lighting matches or paper when the grass caught on fire. The children who lit grass fires were at different ages ranging from 2 to 9. The fire department was notified about four of these grass fires, and fire fighters were asked for educational advice. Two additional children reported grass fires unknown to their parents. Hence, a total of eleven children, eight boys and three girls, set grass on fire while playing with matches.

Parents also reported of five children who burnt rugs while playing with fire. These plays were either done alone or with friends and occurred in bedrooms, bathrooms or living rooms. In one instance, children were left alone at night and played with matches in a bedroom, in another, a girl attempted to

light a cigarette in the bathroom, she put the cigarette in a towel and dropped it on the rug, both items were damaged by the fire. Another fire started when a little boy plugged in a heating coil. In addition, two children reported burn damage to a rug while lighting matches in the house. The plays occurred at different ages ranging from 2 to 9. Hence, a total of seven children, two boys and five girls burnt rugs during fire-play.

Four of these children were also involved in other instances where they burnt home items: one child burnt curtains while putting a fork in the toaster. The other damages were apparently caused on purpose. Two children set a chair on fire and one child burnt a story book. A girl who set a grass fire also burnt a plant hanger to punish her mother for having left her alone. An additional boy played with matches in the closet and set a fire which burnt clothes, paper, and walls.

Purposeful burning of items was done by other children who burnt: a tooth pick, a straw, bugs, bees, wood, paper, leaves, items in the fireplace, paper products, toys and boxes. Eighteen additional children (twelve boys and six girls) were involved in such burns, the details were mostly unknown to their parents. None of these plays resulted in fire and one case a neighbor called the police.

In sum, one child set a fire accidently and thirty-seven children played with fire and burnt different items. Half of all these burns were done intentionally - for the sole purpose of setting things on fire. This brings to the fore a basic question: what is fire? Is a chemical definition of fire sufficient? Does fire have to get out of hand to be called fire? Is the purposeful burning of toys or minor items a fire? These questions about the definition of fire point once again to the need to focus on fire-play rather than

fire-setting of young children.

Fire-play

Analysis of the prevalence of match-play were highly similar to the results of the previous study with about half of the children involved in such play. However, an additional number of children were reported to have been involved in plays with lighters or firecrackers. Thus, according to the extended definition of fire-play, 65% of the children were involved in it. It should be noted that play was reported either by parent, the child, or both. In order to have a detailed analysis of fire-play, children in the sample were divided into five fire groups on the basis of their degree of involvement in the play. The fire groups were:

1. No play (16%)

This group included children who never used fire without parental permission or supervision. Children in this group, though never involved in fire-play still reported some information of fires they saw, of incidents where they found matches, of lighting lighters and firecrackers with parents or stories they heard of fire-play of other children.

2. Friends play (22%)

This group included children who never played with fire but reported friends' play in their presence. Most of the children in this group told detailed stories about fire-play of friends and siblings. Many of them reported watching the incident without any further involvement, others reported attempts to prevent the fire-play by telling adults or by attempting to take the matches away. A few children in this group might have been involved in the fire-play, but did not admit it. One child in this group showed his interest in fires by collecting newspaper articles about fires.

3. One play (22%)

This group included children who were involved in a minor episode of fire-play. Most children reported the play as an attempt to learn how to light matches or lighters done alone or with another child who played the role of fire teacher. In most cases matches were found incidentally as one child said "I found matches under the bed, my mother was on the telephone, I blew it out real fast because the house might set on fire". Another child told us: "I saw them (matches) on the dining room table, I lit one and blew it out." None of the plays done by children in this group resulted in fires. About half of the plays were unknown to parents and were reported by the children only.

4. A few plays (26%)

This group included children who played with fire several times. The majority of the children played with fire in the presence of friends and siblings. The fire-plays occurred to the same extent in the house or in yards, streets and parks. Six outdoor plays resulted in burning grass and the fire department was notified about one of these cases. Four indoor fires caused burn damages to rugs. Other match plays involved lighting and burning paper either in a yard (4 cases) or in the fireplace (2 cases). Two children burnt a straw or a toothpick in order to observe how they burn, one child reported burning bugs and ants. None of these plays resulted in severe damage or in large fires. About half of the fire-plays were unknown to the parents and were reported by the children only.

5. Many plays (14%)

This group included children who played with fires many times. The children were involved in various fire-plays both inside and outside the home. Many of the outdoor fire-plays resulted in burning grass and many of the indoor fire-

plays resulted in burning rugs and chairs. The fire department or the police were called to deal either with the fire or with the child for the fire-play of five out of the nineteen children. All but two of the parents in this group had some information about the fire-play of their children.

In many cases the children burnt items on purpose, they admitted to us: "I like to make paper airplanes and then light them," or "I dropped a match into a light bulb and popped it...I like to build castles and light them...I get a candle and light -- let wax drip on my finger...I make a pocket rocket with a paper clip, match and tin foil" or "I used to take cereal boxes and stuff paper in it and burn a hole in the cereal", or "I put paper in my toy truck and lit it, I put it out with a football pump." One girl admitted to playing with fire because "I was mad at my mother."

All children were aware of the danger involved in their behavior but still did it with their major concern being getting caught by their parents. "I sneaked the matches, first I gathered the matches and hid them under the bed. Then I took them out." Another child said "I am not allowed but sometimes I sneak them (matches)." Children were also aware of the punishment that awaits them for playing with matches, punishment which for many of them was the real danger of fire-play. "I got a whipping already, and my friend's mother burnt his finger for doing it." Another child said "Father found us, sister and me got in trouble" or "we were afraid my friend's father would see. He came, I ran to hide and my friend got a spanking."

Most children in this group expressed fascination and thrill from their match play. Said a girl: "My brother is a fire lover and I am getting there, little by little I am liking fires...I get my thrill out of it." Another boy said "I kind of like playing with fires." Another child reported "I blew the

model car to pieces. It was neat what it (the firecracker) did to the car. It was pretty good."

In addition to the above plays, 77% of the children reported plays of their friends and siblings, half of the parents who had other children reported fire-play performed by them, and 47% of the parents (who were mostly mothers) reported fire-play performed by them in their childhood.

Comparisons of the fire-play groups

Subsequent to our attempt to describe and classify fire-play of children, we asked the obvious questions - do the fire groups include children who differ on other dimensions: sociological, psychological or social. We proceeded with comparisons of the fire groups along with other types of information gathered during our long interviews with the children and their parents.

Background information

Table 1 shows the background variables of the children in the five fire groups and the chi-square statistics for the frequency tables.

Age

A chi-square analysis by fire group and age group showed no significant effect. However, an additional F-test which compared the mean values of the real age revealed a significant age effect. The mean ages were 7.1, 7.3, 7.3, 8.4 and 8.0 for the five fire groups respectively.

Sex

Sixty-six percent of the boys and 58% of the girls were reported to be engaged in fire-play. Though this difference is minor, a closer look reveals a difference in the nature of play, while 32% of the girls were involved in one play episode only 13% of the boys were reported to be involved in such an episode. A chi-square analysis done by the fire groups and sex showed a sig-

nificant effect. Detailed analysis of the fire-plays of boys and girls suggest that boys are more prone to play outside the house while girls play more often indoors.

Family constellation

Children were divided into two groups: those who lived with both biological parents and those who lived with a single parent or two people (adoptive parents, grandparents, a remarried parent, etc.). Results showed that children who lived with both biological parents had a lower tendency to play with fire relative to children who lived in other family constellations.

Race

Children were divided into two groups based on their racial origin. One group included White and Asian and the other Black and Hispanic. A chi-square analysis showed a significant effect with the latter group having higher levels of fire-plays.

Community

The distribution of the fire groups did not show any difference between the two communities.

Health, behavior and accident history

Parents were asked about the occurrence of a number of behavioral problems and accidents in the child's past. The mean number of such problems showed a significant difference among the fire groups (no effect of age or sex was found). Four major problems separated the groups: minor burns, temper tantrums, school problems and behavioral problems. The highest frequency of these problems was for the "many" plays fire group: At least fifty percent of the children in this group suffered from minor burns, showed temper tantrums, had school problems which were mainly behavioral rather than academic, and had

behavioral problems expressed by extreme fighting, stealing and other anti-social behaviors.

Performance and knowledge variables

A number of performance and knowledge variables were collected during the interviews with the children. None of them showed any relationship to the fire groups suggesting that children who play with fire frequently are in no way cognitively inferior to the children who do not play with matches.

Preference variables

Children's preferences were collected on a number of measures. One of these tests was a fire attraction measure. In this measure seven pairs of drawings showing children either lighting or extinguishing fire or using fire or water (see figure). The children were asked "which one is more fun to do"? Results showed a significant effect of fire group with the highest mean value for the "many plays" group. The mean value of choices of lighting or extinguishing fire were 1.3, 0.7, 0.6, 1.0, and 2.3 for the five fire groups respectiely.

Evaluation of interviewers

The two interviewers evaluated the home environment on a scale developed by Block and Block. Analysis of variance of scale items by age group, sex and fire group revealed a significant fire group effect of 14 items which are presented in Table 2. The mean values of these evaluations show differences among the fire groups, and especially between the "many" plays group and the other groups. The first three items show that the high fire group had lower mean values on stability, calmness and consideration in the family atmosphere. Items 4 and 5 show higher mean values in the "few" and "many" groups on atmosphere of discord and conflict, constriction, supression and cheerlessness.

Items 6 and 7 show that parents of children in the high fire groups seem less effective in managing family demands and less enjoying their parental role. Item 8 shows that they appear more neurotic and brittle, they also have more problems in coping with the child's energy as shown by item 9. The last five items show that the nature of parent-child communication and interaction is less positive for the high fire group. An additional item about the quality of the relations between parent and child also showed a significant fire group effect with the mean values being 5.6, 5.9, 5.6, 5.2 and 5.0 for the five fire groups respectively, again showing worse relations for the "few" and "many" play groups.

Interviewers also evaluated the characteristics of the child on 44 adjectives. These adjectives were subject to factor analysis which showed three main factors. One of these factors included the following items with positive loadings: active, adventurous, impulsive, rebellious, restless, mischievous, aggressive, stubborn, and the following items with negative loadings: calm, obedient, careful, quiet, self-controlled. All the items pertaining to this factor were significantly related to the fire groups, the positively loaded items - positively, and the negatively loaded items, negatively.

Evaluation of parents

During the interview, parents evaluated their children on a number of dimensions, the five groups differed significantly on evaluations of physical hyperactivity (means:3.0, 3.4, 4.2, 3.4, and 4.6), impulsivity and inability to control self (means: 2.3, 2.2, 3.3, 3.2, and 3.2) and breaking and losing toys and games (means: 2.5, 2.4, 3.2, 3.9, and 4.1).

Both mothers and fathers also responded to a research questionnaire. It included questions about the frequency in which their children perform

mischievous behaviors such as agression toward people and property and anti-social behaviors. The children in the "many" plays group had higher mean values on all 20 mischievous behaviors studied.

Discussion

The studies of fire behavior of young children showed that interest in fire and fire-play are common phenomena. This study showed that half of the children in kindergarten played with fire materials, the previous study showed that 27% of kindergarten boys played with matches, and a study of 53 kindergarteners performed by Barbara Vance in Utah using the measures developed at the University of California, Berkeley, showed that 21% played with matches. Results for second and fourth grade children showed even higher percentages of fire-play. The overall findings suggest, in the words of an interviewed boy, that "I think it is normal for boys to light matches", and in the light of the present study we can add - also for girls. However, frequent fire-play was found to be associated with problem areas in the children's upbringing.

In line with the results of the previous study, the present study shows that match-play is related to problem areas in the children's life. Children who are involved in match-play show a higher incidence of behavioral problems, they come from more impoverished backgrounds and suffer from lack of stability and support from their environment relative to their non-problematic peers.

The picture of the fire-players is similar to the picture of firesetters which emerges from the literature. This similarity is surprising especially in the light of the fact that the present study surveyed the behavior of a sample of normal children, whereas other studies of firesetting investigated children who had a variety of other problems as well. The similarity suggests a behavioral continuum, which has on one extreme the repeater firesetters,

close to it are the non-repeater firesetters, then those who light matches and then, at the other extreme, those who are devoid of behavioral problems and risk-taking behaviors.

This pattern of personality of the match-players and firesetters was also found to be very similar to the personality of the accident-repeater children. This picture was presented by Manheimer and Mellinger (1967), and supported by Block and Block (1975), showed that children who are frequently involved in accidents are mischievous, aggressive and impulsive, traits which lead them to high accident exposure. The children also have similar personality characteristics to those of hyperactive children as well as delinquent children.

Fire-players, fire-setters, accident-prone children, hyperactive children and delinquent children show very similar behavioral and personality patterns as well as similar family conditions. Whether social learning theory as suggested by Vreeland and Waller (1979) accounts for these similarities or any other psychological model has yet to be tested. We hope, however, that in these first attempts to describe fire plays of children and their related sociological and psychological variables we contributed to the understanding of the anti-social behavior of fire-setting. The applied problem is in providing constructive ways for these vigorous and energetic children to express their adventurous exploration of the environment. In terms of fire prevention, it seems that cognitive programs designed by educators and prohibitive actions imposed by parents are not the surest route to fire prevention. Interest in fire is one aspect of children's interest in the world and should be channelled toward mastery of fire and development of fire skills rather than to secretive dangerous plays. Our results suggest that parents do seek help in dealing with the fire behaviors of their children. Providing them with such

help and advice is an important role of the fire department as we will hear in the presentation of Joe Day.

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TABLE 1

Background information of the children

in the five fire groups - percentages (N=139)

Fire Group	Age Group			Sex		Family Constellation		Race		Community	
	Kinder garten (N=50)	Second Grade (N=46)	Fourth Grade (N=43)	Boys (N=70)	Girls (N=69)	Both biological Parents (N=84)	Two people or single Parent (N=55)	White and Asian (N=98)	Black and Spanish (N=41)	Hayward (N=79)	Oakland (N=60)
1. No play (N=22)	24	11	11	10	22	21	7	21	2	16	15
2. Friends' play (N=31)	26	28	12	24	20	26	17	26	17	23	22
3. One play (N=36)	22	24	21	13	32	18	29	20	27	19	26
4. A few plays (N=36)	16	24	40	31	20	25	27	21	37	27	25
5. Many plays (N=19)	12	13	16	22	6	10	20	12	17	15	12
	Chi-square = 12.0			Chi-square=16.8		Chi-square = 10.3		Chi-square=10.9		Chi-square =1.3	
	p< .15			p< .01		p< .04		p< .03		p< .86	

TABLE 2

Evaluations of Interviewers

Environmental evaluations

1	2	3	4	5	6	7
Very Atypical	Somewhat Atypical	Slightly Atypical	Neither Typical Nor	Slightly Typical	Somewhat Typical	Very Typical

	Mean Values					
	Fire Group					
	No play	Friends play	One play	A few plays	Many plays	F value
1. The family seems stable; there seems to be a sense of permanence.	6.1	6.0	5.5	5.6	5.3	4.13*
2. The family atmosphere seems calm and peaceful.	5.2	5.2	4.9	4.4	4.1	5.10*
3. There is a family atmosphere of consideration of the needs of others	5.8	5.7	5.5	5.3	5.2	2.79*
4. There is a family atmosphere of discord, conflict, and recrimination.	2.4	2.2	2.5	2.7	3.1	3.01*
5. The atmosphere of the home is constricted, suppressive, and cheerless. (N.B. Opposite end implies family atmosphere was cheerful.)	2.3	2.2	2.3	2.6	2.9	3.07*
6. Parent seems to be effective in managing competing family demands. (N.B. Low placement indicates parent becomes disorganized or goes to pieces under the stress of demands.)	5.7	5.8	5.6	5.3	5.3	2.43*
7. Parent seems to enjoy his/her parental role.	5.8	5.9	5.6	5.6	5.3	2.78*
8. Parent seems neurotic, brittle and anxiety-laden.	2.8	2.4	2.8	2.9	3.5	4.11*
9. Parent seems to have problems in coping with child's energy.	2.5	2.3	2.4	2.9	3.4	5.94*
10. Parent/Child communication is direct and open.	5.4	5.6	5.2	5.1	4.6	4.00*
11. Parent seems to set clear limits on child's behavior.	5.7	5.7	5.5	5.3	4.7	4.07*
12. Parent seems to provide behavioral direction for the child.	5.8	5.8	5.6	5.4	5.0	3.91*
13. Parent seems to provide constant feedback and support to the child.	5.4	5.7	5.4	5.3	4.8	3.55*
14. Parent seems to know the child's preferences and attitudes.	5.7	5.8	5.6	5.2	4.9	8.86*

* p< .05

Fire attraction measure

X

X

X

X

X

X

X